

## WHAT IS CLAIMED IS:

1. A method of preparing autologous T-lymphocytes for re-introduction into a patient having cancer, which method comprises:
  - (i) obtaining peripheral blood mononuclear cells (PBMCs) from a patient immunized with an antigen of the cancer,
  - (ii) stimulating the PBMCs with the antigen of the cancer *in vitro*, and
  - (iii) transducing the PBMCs with a retroviral vector, which (a) comprises and expresses a human interleukin-2 (IL-2) coding sequence operably linked to a retroviral promoter, (b) does not comprise an exogenously introduced gene that enables phenotypic selection, and (c) comprises a viral envelope that efficiently transduces CD8+ T-lymphocytes,whereupon autologous T-lymphocytes are prepared for re-introduction into a patient having cancer.
2. The method of claim 1, wherein the cancer is melanoma.
3. The method of claim 2, wherein the antigen of the cancer is gp100.
4. The method of claim 3, wherein the antigen is amino acids 209-217 of gp100 with a methionine substitution at position 210 (209-2M peptide).
5. The method of claim 1, wherein the cancer is breast cancer.
6. The method of claim 5, wherein the antigen of the cancer is Her-2/Neu.
7. The method of claim 1, wherein the cancer is prostate cancer.
8. The method of claim 7, wherein the antigen of the cancer is prostate-specific antigen (PSA).
9. The method of claim 1, wherein the cancer is colon cancer.
10. The method of claim 9, wherein the antigen of the cancer is carcinoembryonic antigen (CEA).

11. The method of any of claims 1-10, wherein the viral envelope protein is Gibbon ape leukemia virus envelope (GALV).
12. The method of any of claims 1-11, wherein the retroviral vector further comprises and expresses a human IL-2 receptor  $\alpha$ -chain coding sequence.
13. The method of any of claims 1-11, wherein the method further comprises introducing into the PBMCs a vector comprising and expressing a human IL-2 receptor  $\alpha$ -chain coding sequence operably linked to a promoter.
14. A composition comprising T lymphocytes obtained in accordance with the method of any of claims 1-13, wherein 75% or more of the T lymphocytes are CD8+ and the cells do not contain an exogenously introduced gene that enables phenotypic selection.
15. A method of treating a patient having cancer, which method comprises administering to the patient autologous T lymphocytes, which have been prepared in accordance with the method of any of claims 1-13, in an amount sufficient to treat the patient for cancer.
16. A method of treating a patient having cancer, which method comprises administering to the patient autologous T lymphocytes, which have been prepared in accordance with the method of any of claims 1-11, alone or in further combination with human IL-2 receptor  $\alpha$ -chains, in amounts sufficient to treat the patient for cancer.
17. A method of preparing autologous tumor-infiltrating lymphocytes (TILs) for re-introduction into a patient having cancer, which method comprises:
  - (i) obtaining TILs from a patient, who has been optionally immunized with an antigen of the cancer,
  - (ii) transducing the TILs, which have been optionally stimulated with the antigen of the cancer *in vitro*, with a retroviral vector, which (a) comprises and expresses a human IL-2 coding sequence operably linked to a retroviral promoter, (b) does not comprise an exogenously introduced gene that enables phenotypic selection, and (c) comprises a viral envelope that efficiently transduces CD8+ TILs, and

(iii) nonpharmacologically enriching IL-2-transduced CD8<sup>+</sup> TILs, whereupon autologous TILs are prepared for re-introduction into a patient having cancer.

18. The method of claim 17, wherein the cancer is melanoma.
19. The method of claim 18, wherein the antigen of the cancer is gp100.
20. The method of claim 19, wherein the antigen is 209-2M peptide.
21. The method of claim 17, wherein the cancer is breast cancer.
22. The method of claim 22, wherein the antigen of the cancer is Her-2/Neu.
23. The method of claim 17, wherein the cancer is prostate cancer.
24. The method of claim 23, wherein the antigen of the cancer is PSA.
25. The method of claim 17, wherein the cancer is colon cancer.
26. The method of claim 25, wherein the antigen of the cancer is CEA.
27. The method of any of claims 17-26, wherein the viral envelope protein is GALV.
28. The method of any of claims 17-27, wherein the retroviral vector further comprises and expresses a human IL-2 receptor  $\alpha$ -chain coding sequence.
29. The method of any of claims 17-27, wherein the method further comprises introducing into the TILs a vector comprising and expressing a human IL-2 receptor  $\alpha$ -chain coding sequence operably linked to a promoter.
30. A composition comprising TILs obtained in accordance with the method of any of claims 17-29, wherein 75% or more of the TILs are CD8<sup>+</sup> and the cells do not contain an exogenously introduced gene that enables phenotypic selection.

31. A method of treating a patient having cancer, which method comprises administering to the patient autologous TILs, which have been prepared in accordance with the method of any of claims 17-29, in an amount sufficient to treat the patient for cancer.

32. A method of treating a patient having cancer, which method comprises administering to the patient autologous TILs, which have been prepared in accordance with the method of any of claims 17-27, alone or in further combination with human IL-2 receptor  $\alpha$ -chains, in amounts sufficient to treat the patient for cancer.